Scientific Inquiry

2-1 The student will demonstrate an understanding of scientific inquiry, including the processes, skills, and mathematical thinking necessary to conduct a simple scientific investigation.

2.1.2 Use tools (including thermometers, rain gauges, balances, and measuring cups) safely, accurately, and appropriately when gathering specific data in US customary (English) and metric units of measurement.
Taxonomy Level: 3.2-B Apply Factual Knowledge

Previous/Future knowledge: In previous grades, students used magnifiers and eyedroppers (K-1.2) and rulers (1-1.2) safely, accurately, and appropriately. In future grades, students will continue to use these tools, when appropriate, as well as use new tools when collecting scientific data. A complete list of tools can be found in Appendix A of the Academic Standards.

It is essential for students to know that every simple scientific investigation provides information. This information is called *data*. Data can be simple observations or measurements (in US customary/English and metric units).

It is essential for students to know that different tools are needed to collect different kinds of data.

- A *thermometer* is a tool that measures temperature.
  - When using a thermometer, make sure not to place the bulb of the thermometer on the bottom or sides of the container or touch the bulb when taking air temperature.
  - When reading the temperature on a thermometer, it should be vertical and at eye level with the top of the liquid in the glass tube.
  - A thermometer measures temperature in degrees Fahrenheit (^{o}F) and Celsius (^{o}C) to the nearest degree.

NOTE TO TEACHER: Fahrenheit will be used to measure weather data only. All other temperature readings will be taken using the Celsius scale.

- A *rain gauge* is a tool that measures the amount of rainfall.
  - To collect rainfall accurately, the rain gauge must be in an open area.
  - To read the rain gauge, hold it at eye level.
  - A rain gauge measures the amount of rainfall in inches (in).
- A *balance* is a tool that measures the mass of an object compared to a known mass. *Mass* is the amount of *matter*, or material, in an object.
  - When using a *pan* or *bucket* balance, be sure the balance pointer begins at zero (is level).
  - Place the object being measured on one side.
  - Place the known masses on the opposite side until the balance is level and the pointer is again at zero.
  - When the balance is level, the mass of the object is equal to the total of the known masses.
  - A balance measures the mass of an object in grams (g).
- A *measuring cup* is a tool that measures volume.
  - To read the measuring cup, place the cup on a level surface.
  - When using the measuring cup to measure volume of a solid, be sure the top surface of the solid is level.
  - A measuring cup measures volume in fluid ounces (oz), parts of a cup (c), milliliters (mL), or liters (L).

Scientific Inquiry

2-1 The student will demonstrate an understanding of scientific inquiry, including the processes, skills, and mathematical thinking necessary to conduct a simple scientific investigation.

It is essential for students to use care when handling these tools when gathering data.

- Care should be taken not to break the thermometers, rain gauges, or measuring cups.
- Use only thermometers with colored alcohol in them (such as red or blue), NEVER mercury thermometers (silver liquid in them).
- Remove all objects and known masses from the balance when measuring is completed.

It is also essential for students to use tools from previous grade levels that are appropriate to the content of this grade level such as eyedroppers, magnifiers, or rulers (measuring to centimeters), to gather data.

NOTE TO TEACHER: See previous grade information regarding how to use each tool.

It is not essential for students to use a beam balance, beakers, or graduated cylinders. Students do not need to measure in pints, quarts, or gallons. Students do not need to convert measurements from English to metric or metric to English.

Assessment Guidelines:
The objective of this indicator is to *use* tools safely, accurately, and appropriately when gathering data; therefore, the primary focus of assessment should be to apply correct procedures to the use of thermometers, rain gauges, balances and measuring cups and other tools essential to the grade level that would be needed to conduct a science investigation. However, appropriate assessments should also require students to *identify* appropriate uses for magnifiers and eyedroppers; *illustrate* the appropriate tool for an investigation using pictures, diagrams, or words; *recall* how to accurately determine the measurement from the tool; or *recognize* ways to use science tools safely, accurately, and appropriately.